MULTIMEDIA UNIVERSITY

STUDENT ID NO

Seat No.:

Venue: _____

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2015/2016

TCS2221 – COMPUTER GRAPHICS

(All sections / Groups)

Question	Marks
Total	

01 MARCH 2016
09:00AM – 11:00AM
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This Question Paper consists of 15 printed pages with 6 Questions only.
2. Attempt **FIVE** out of **SIX** questions.
3. All questions carry equal marks and the distribution of the marks for each question is given.
4. Please print all your answers in this Question Booklet itself.

Question 1

(a) Consider three different raster systems with resolutions of 800 by 600, 1280 by 960, and 1680 by 1050. What is the size of the frame buffer (in MB) that is needed for each of these systems to store 32 bits per pixel?

[3 marks]

(b) Write the OpenGL commands to set up an OpenGL display window whose lower-left corner is at pixel position (85, 210) and has a window width of 210 pixels and a height of 160 pixels.

[3 marks]

Continued.....

(c) Compare the advantages and disadvantages of raster-scan displays and random-scan displays.

[4 marks]

Continued.....

Question 2

(a) Given the points A (1 ,2, 1), B (2, 3 , 4) and C (6, 2, 6)

1. Find the vector $v_1 = \overrightarrow{AB}$ and $v_2 = \overrightarrow{AC}$.
2. What is the distance between:
   i. points A and B?
   ii. points A and C?
3. Compute the cross product of v_1 and v_2, $v_1 \times v_2$
4. Find the equation for the plane ABC.
5. Find the distance between this plane to point (3, 3, 6).

[5 marks]

Continued.....

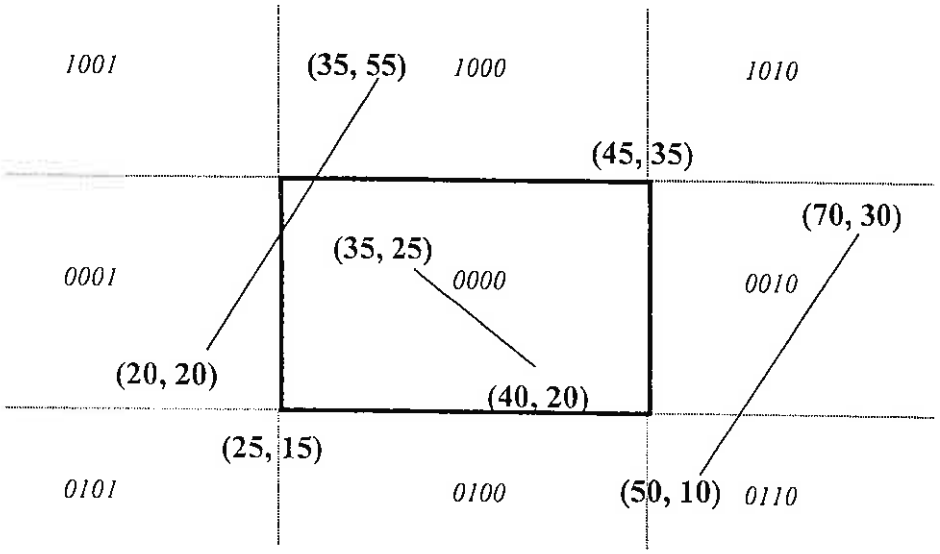
(b) Given a straight line from a pixel coordinate (-1, 1) to pixel coordinate (3, 4). Indicate which raster locations would be chosen by Bresenham's Algorithm.

[5 marks]

Continued.....

Question 3

(a) Cohen Sutherland's clipping algorithm is commonly used to solve the line clipping problem. Given the clipping window coordinates (25, 15) and (45, 35), in relation to the following lines (s1, s2 represent the two end points for a line),



i. s1 = (50, 10) and s2 = (70, 30)
ii. s1 = (20, 20) and s2 = (35, 55)
iii. s1 = (40, 20) and s2 = (35, 25)

Identify whether the line falls into – "Trivial Accept", "Trivial Reject" or "Other Cases". If the line falls under "Other Cases", compute the intersection point(s) and state the two new end points.

[7 marks]

Continued.....

Continued.....

(b) List the TWO basic characteristics of Fractal-Geometry methods.

[2 marks]

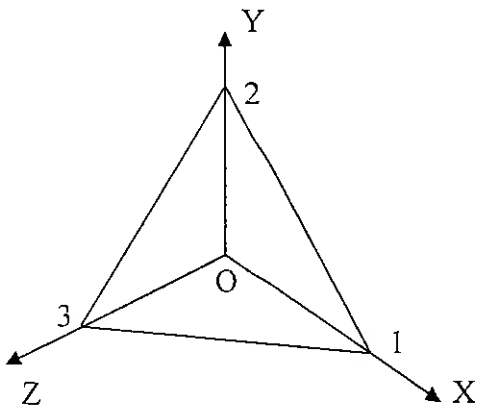
(c) Which features do sweep representations utilize to create 3D objects?

[1 mark]

Continued.....

Question 4

(a) The tetrahedron below is constructed with vertices at (0,0,0), (1,0,0),(0,1,0), and (0,0,1).



1. List the triangle surfaces. [4 marks]
2. List the normals for each triangle surface. [4 marks]

Continued.....

(b) Briefly explain what a view volume is.

[2 marks]

Continued.....

Question 5

(a) Rotate a 2D object at 45 degree anti-clockwise about Z axis. Then, scale the object 3 times along X-axis and 5 times along Y-axis. Next, translate the object to coordinate (5, 2).

1. Find the composite matrix ($\mathbf{C}_m$) for the transformation above.

[5 marks]

2. What is the new coordinate if the same transformation is to be applied on point Q (4, 6)?

[2 marks]

Continued.....

Continued.....

(b) Three control points of a Bezier curve are $P_0 = (4, 5)$, $P_1 = (7, 8)$ and $P_2 = (9, 3)$. What are the coordinates on the curve when the ratio u is set to 0.2?

[3 marks]

Continued.....

Question 6

(a) Write the OpenGL commands to perform the following:

1. Define a front face as the face with counterclockwise ordering of vertices.
2. Enable the polygon culling.
3. Cull the back face of the polygon.
4. Activate the depth-buffer visibility-detection routines.

[4 marks]

(b) List the steps to perform texture mapping in OpenGL.

[4 marks]

Continued.....

(c) What is the main difference between Phong shading and Gouraud shading?

[2 marks]

End of Page